PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION International Bureau

EP 0507875

F64

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : D21H 11/20

A1

(11) International Publication Number: WO 91/10010

(43) International Publication Date: 11 July 1991 (11.07.91)

(21) International Application Number: PCT/US90/07392

(22) International Filing Date: 20 December 1990 (20.12.90)

(30) Priority data:
458,011 28 December 1989 (28.12.89) US

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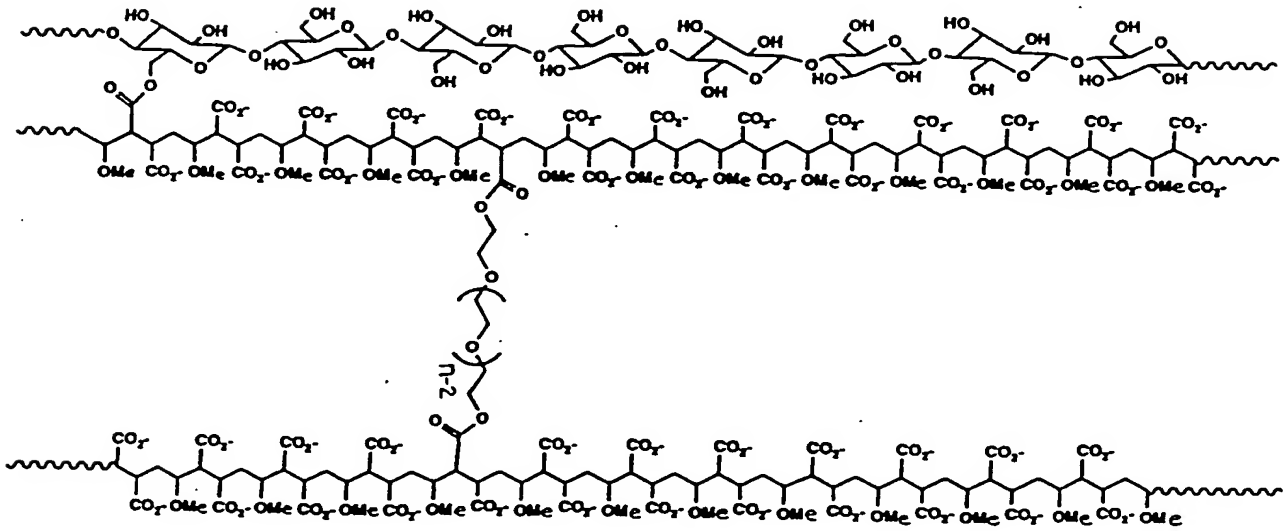
(81) Designated States: AT (European patent), AU, BE (European patent), BR, CA, CH (European patent), DE (European patent), DK (European patent), ES (European patent), FI, FR (European patent), GB (European patent), GR (European patent), IT (European patent), JP, KR, LU (European patent), NL (European patent), SE (European patent).

Published
With international search report.

(54) Title: CELLULOSE FIBER MODIFIED WITH POLY(METHYL VINYL ETHER-CO-MALEATE) AND POLYOL



(57) Abstract

Disclosed is a fiber comprising, chemically bonded together, (a) a conventional cellulosic fiber, such as a Kraft fiber or a chemithermomechanical pulp fiber; (b) poly(methyl vinyl ether-co-maleate) copolymer, such as the acid form of a 1:1 (molar) poly(methyl vinyl ether-co-maleate) copolymer, preferably having number average molecular weight of about 67,000-80,000; and (c) a polyol, such as polyethylene glycol; also disclosed are methods for making such fibers, especially evaporatively depositing an intimate mixture of the copolymer and polyol on the discrete fiber followed by thermally crosslinking at specific temperatures for limited periods; absorbent paper which can be made by wet-laying the fiber, especially in admixture with conventional fiber; and derivative paper structures, such as multiply disposable absorbent towels.

Claims

1. A chemically modified fiber having a water absorbency and retention value in the range from 15 g/g to 100 g/g characterized by chemically bonded together:
(a) a cellulosic fiber selected from the group consisting of chemithermo-mechanical pulp fiber, bleached hardwood Kraft pulp fiber, bleached softwood Kraft pulp fiber, unbleached hardwood Kraft pulp fiber, unbleached softwood Kraft pulp fiber, bleached softwood sulfite pulp fiber, bleached hardwood sulfite pulp fiber, unbleached softwood sulfite pulp fiber, unbleached hardwood sulfite pulp fiber, cotton linters, mercerized dissolving pulp fiber, unmercerized dissolving pulp fiber, and mixtures thereof;
(b) a poly(methyl vinyl ether-co-maleate) 1:1 copolymer having a number average molecular weight in the range from 39,000 to 80,000, and
(c) a polyol;
wherein the proportion by weight of said poly(methyl vinyl ether-co-maleate) copolymer to said polyol is from 250:1 to 3:1 and the weight of said poly-(methyl vinyl ether-co-maleate) copolymer plus said polyol per unit weight of said cellulosic fiber, (a), is in the range from 0.3 to 2, preferably from 0.8 to 1.2, the poly(methyl vinyl ether-co-maleate) copolymer weight being expressed on an acid equivalent basis.

2. A chemically modified fiber according to Claim 1 wherein said cellulosic fiber, (a), is selected from the group consisting of chemithermomechanical pulp fiber, bleached hardwood Kraft pulp fiber, bleached softwood Kraft pulp fiber, unbleached hardwood Kraft pulp fiber, unbleached softwood Kraft pulp fiber and mixtures thereof; said poly(methyl vinyl ether-co-maleate) copolymer has number average molecular weight in the range from 67,000 to 80,000, said polyol is a diol of formula $HO(CH_2CH_2O)_nH$ wherein n is from 1 to 154, preferably from 70 to 80; said proportion by weight of poly(methyl vinyl ether-co-maleate) copolymer to polyol is from 10:1 to 5:1; and wherein said water absorbency and retention value is in the range from 50 g/g to 80 g/g.

3. A chemically modified fiber according to Claim 1 or 2 wherein the cations, which are inherently present in a charge-balancing amount, are selected from the group consisting of sodium, potassium, lithium, hydrogen and mixtures thereof, preferably sodium, hydrogen and mixtures thereof.

4. A cellulosic papermaking pulp characterized by the chemically modified fiber of any one of Claims 1-3.

5. A cellulosic papermaking pulp according to Claim 4 wherein the content of cations which are hydrogen is such as to produce a pH of less than 5 when dispersed in water.

6. A cellulosic papermaking pulp according to Claim 4 or 5 wherein the content of cations which are hydrogen is such as to produce a pH of 6 to 9 when dispersed in water.

7. A cellulosic papermaking pulp characterized by from 5% to 60% of the chemically modified fibers of any one of Claims 1-3 and from 40% to 95% of conventional cellulosic fiber.

8. A process for preparing a chemically modified fiber having a water absorbency and retention value in the range from 15 g/g to 100 g/g characterized by a step of:

thermally cross-linking, at a curing temperature of from 100 ^{o}C to 140 ^{o}C, preferably from 125 ^{o}C to 130 ^{o}C, for a curing time of from 120 minutes to 3 minutes, preferably from 11 minutes to 5 minutes, (a) a starting-material pulp consisting essentially of cellulosic fiber selected from the group consisting of chemithermomechanical pulp fiber, bleached hardwood Kraft pulp fiber, bleached softwood Kraft pulp fiber, unbleached hardwood Kraft pulp fiber, unbleached softwood Kraft pulp fiber, bleached softwood sulfite pulp fiber, unbleached softwood sulfite pulp fiber, cotton linters, mercerized dissolving pulp fiber, unmercerized dissolving pulp fiber, and mixtures thereof, preferably selected from a chemithermomechanical pulp fiber, bleached hardwood Kraft pulp fiber and bleached softwood Kraft pulp fiber and mixtures thereof; with an intimate mixture of: (b) a poly(methyl vinyl ether-co-maleate) copolymer, preferably having a methyl vinyl ether content of 50 mole %, and a

maleate content of 50 mole %, and (c) a polyol, preferably of the formula $HO(CH_2CH_2O)_nH$ wherein n is from 1 to 154; wherein the proportion by weight of poly(methyl vinyl ether-co-maleate) copolymer to polyol is from 250:1 to 3:1, preferably from 30:1 to 4:1, and the weight of poly(methyl vinyl ether-co-maleate) copolymer plus polyol per unit weight of cellulosic fiber, (a), is in the range from 0.3 to 2, preferably from 0.6 to 1.5, wherein the poly(methyl vinyl ether-co-maleate) copolymer weight is expressed on an acid equivalent basis.

9. A process according to Claim 8 comprising the steps, in sequence, of forming said intimate mixture of copolymer and polyol by evaporating an aqueous medium having a pH of from 1.6 to 3.5, preferably from 1.6 to 3.0, in the presence of said starting-material pulp; followed by thermally cross-linking at said curing temperature for said curing time.

10. A process according to Claim 8 or 9 wherein said starting-material pulp, said copolymer and said polyol are thermally cross-linked as a thin layer, preferably followed by an additional step of acid repulping in water, followed by an additional, fiber-swelling step, comprising neutralizing with sodium hydroxide.

11. The product of a process according to any one of Claims 8-10, characterized by a chemically modified fiber having a water absorbency and retention value in the range from 25 g/g to 90 g/g.

12. A wet-laid paper web characterized by from 5% to 60%, preferably from 10% to 60%, of the chemically modified fiber of any one of Claims 1-3.

13. A disposable absorbent article characterized by one or more plies of the wet-laid paper web of Claim 12.